2/23/05 Meeting Notes – Landfill Stability Workgroup
Raptor Conference Room – South Central Region Headquarters
website: http://dnr.wi.gov/org/aw/wm/solid/landfill/stability/index.htm

Attending: Sherren Clark (BT^2), Bob Ham (UW-Madison), Gerard Hamblin (WMWI), Dan Leclaire (WMWI), Gene Mitchell (DNR), Aga Razvi (UW-Stevens Point), John Reindl (Dane County), Joe Van Rossum (UW-Extension/SHWEC), Todd Watermolen (Onyx), Brad Wolbert (DNR)

I. General Items: Gene Mitchell presented a summary of the group's work at the landfill operators' workshop at the AROW/SWANA conference in Green Bay 2 weeks ago. He did not receive much feedback from the ~60 attendees, but he did answer several clarifying questions.

II. Table of Stabilization Strategies: The group agreed that, with a couple of minor corrections, this table should now be put on the website as a group work product. The minor corrections included prefacing the table with the issue statement, adding the source for the statements about energy savings relative to landfilling, and clarifying that some of the options don't directly reduce the amount of degradable organics in landfills.

III. Measurement Approaches: The bulk of the meeting was spent discussing ideas for measuring progress towards organics stabilization ("presumptive" measures) and for measuring whether the target level of organics stabilization has been achieved ("confirmatory" measures). Key points:

- There was agreement that the measurements would depend on the type of stabilization plan – pre-landfill (diversion or processing) vs in-landfill treatment – that is implemented at each facility.

- Regarding direct waste sampling:

  - it is challenging, but methods, including ASTM standards, do exist
  - the EU has developed sampling standards; some researchers have proposed that sampling techniques be based on those used in the mining industry as a method of obtaining better accuracy

- To determine the composition of waste before it goes into a landfill, which would be necessary for an approach using a carbon mass balance, it may be possible to improve the precision of the overall estimate by making separate estimates for large homogeneous waste streams such as industrial waste.

- Measuring moisture content could provide a simple, cheap test – an indicator of whether degradation is occurring. An increase in temperature and moisture content is a reliable indicator of gas production; well understood by operators.

- Regarding moisture in landfills:

  - it's not clear that operators can get enough liquids to optimize a bioreactor
  - leachate recirculation alone might not support acceptable level of stabilization

- precipitation is a larger source of liquid than leachate generation
- potential conflicts exist between methods to increase moisture and need to control gas emissions – the quantity of gas generated may overwhelm collection systems

- We have talked about using carbon for presumptive measurement. In terms of environmental impacts, carbon is a gas issue due to methane, but carbon is not a significant leachate issue. Ammonia and VOCs are the components of leachate that cause environmental impacts. Regarding VOCs:

  - VOCs are driving remediations of old closed landfills
  - there are both degradable and non-degradable VOCs in landfills
  - VOCs decline over time as they are stripped off of gas and otherwise degraded
  - the suite of VOCs in leachate has changed over time with changing waste inputs
  - we don't know if bioreactors will reduce VOCs adequately within our timeframe

- We are trying to move beyond the dry tomb state of practice to something less risky. However, dry tombs may be acceptable if they don't contain organics in the first place. Approaches that divert organics or that pretreat them for stabilization before landfilling would likely allow some level of unstabilized organics to be landfilled – how much is too much?

- We have talked in the past about determining a gas curve for a site, and determining when we have captured the volume of gas that would place the site within the tail of the curve below a threshold of concern regarding the potential for the site to produce significant gas.

  - gas curves may be correct conceptually, but not in a detailed way
  - if you're aggressively adding moisture, especially from the beginning of filling, some of the required gas production measurements may not be available
  - significant errors would arise from the initial determination of the gas curve

- A concept for evaluating stability was proposed that would rely on gas measurements for achieving presumptive stability, and leachate testing for confirming that stability has been reached. The specific measures would be:

  <u>PRESUMPTIVE</u>
  (1) a sustained gas flux $< 1\%$ of peak (sustained) gas flux and reflective of a downward trend
  (2) based on gas measurements, 75% of projected carbon eliminated; baseline determined by:
      a. knowledge of incoming waste composition, with default carbon values, or
      b. site specific testing to determine carbon values
  (3) methane remains below lower explosive limit when the gas extraction system is turned off.

  <u>CONFIRMATORY</u>
  leachate meets groundwater quality standards over some set period of time

Neither a dry-tomb landfill nor an acid-locked landfill could pass these tests. An alternative confirmatory test that might be preferable would be direct sampling of wastes. The confirmation needs to be robust to support the concept that there would be no lingering liability for the owner. In theory, the liner could be intentionally breached to open the system. Further discussion could be held on where the groundwater standards need to be met (e.g., in the leachate itself or at the NR 140 design management zone some distance from the waste mass), or whether the groundwater standard should be absolute or risk based.

IV. Prescriptive Approaches to Reducing Unstabilized Organics: The group discussed ideas for prescribed actions that might be designated as acceptable, and the measurement implications of the actions.

- Bans on organics or subsets of organics (e.g., yard and food waste plus compostable paper; yard waste plus food waste plus all paper plus wood; yard waste plus food waste plus low-lignin paper) could be instituted. Use of bans could significantly reduce the measurements needed if the bans were effective in keeping organics out of landfills (measurements of waste inputs would still be needed).

- Alternatively, bans could be coupled with a provision allowing landfills operating an approved in-situ treatment system (e.g., a bioreactor) to accept organic wastes, with all the measurement provisions that would apply.

- Having no bans, or no bans beyond the current yard waste ban, are options.

Bans have the advantage of providing a level playing field for landfill operators, in addition to simplifying measurement and being simple and clear. The group discussed whether or not bans are effective in preventing waste, whether they restrict choices for future generations, and whether our group's charge extends beyond landfill regulations to solid waste management practices. From the environmental management systems perspective that the DNR Waste Management program has adopted for policy development, it would seem that solid waste management, or, even more broadly, materials management, should be examined as part of the group's work. The group agreed that bans need to be evaluated in terms of total system impacts – i.e., what happens to the organics if they don't go to landfills, and what are the consequent impacts?

V. UW Research Grant: Prof. Aga Razvi engaged the group in a discussion of research needs that could be addressed through a research grant funded project. Group members are encouraged to contact Dr. Razvi with further ideas at Aga.Razvi@uwsp.edu.

VI. Next Meeting: The next meeting will be April 6 at 1:00 pm in the DNR's SCR Raptor Conference Room, as previously scheduled. The following meeting was scheduled for Tuesday, May 3 at 1:00 and will also be in the DNR's SCR Raptor Conference Room.

Topics for the next meeting will be further discussion of the presumptive and confirmatory measurement proposal (the 1% - 75% framework), further discussion of indicator measures like moisture content, and possible outlines for stability plans.